LETTER WORK PLAN
2018 RADIUM AND OTHER RADIOLOGICAL MATERIALS
GROUNDWATER INVESTIGATION
FACILITY WIDE
NWIRP BETHPAGE, NEW YORK

Introduction

The Navy is conducting an investigation to evaluate the potential release of radium and other radiological materials at the facility using the existing groundwater monitoring well network located at the former Naval Weapons Industrial Reserve Plant (NWIRP) Bethpage, New York (Figures 1 and 2). The existing groundwater monitoring well network is currently used to evaluate the release and cleanup of select volatile organic compounds (VOCs), polychlorinated biphenyls, and/or metals in groundwater resulting from operations at former NWIRP Bethpage. This letter work plan was prepared by Tetra Tech, Inc. (Tetra Tech) under the Naval Facilities Engineering Command (NAVFAC) Atlantic Comprehensive Long-Term Environmental Action Navy (CLEAN) under Contract Number N62470-16-D-9008 Task Order WE13.

In 2013, radium was identified in a water supply well at Bethpage Water District Plant 4, located to the southeast of the former NWIRP Bethpage, at concentrations exceeding drinking water standards. As such, groundwater investigations upgradient of this location were initiated. To evaluate the presence and distribution of radionuclides in groundwater, samples were collected between 2013 and 2017 from various wells in the vicinity of NWIRP Bethpage and tested for radionuclides. Samples were collected by the Navy, NG, and NYSDEC from monitoring wells, public supply wells, production wells, and recovery wells.

The objective of this investigation is to determine whether there is any evidence of a source of radium or other radiological material that could result in a Maximum Contaminant Level (MCL) exceedance in either on property or off property groundwater. The data collected from this investigation will be used to support the development of a Preliminary Assessment/Site Investigation Report.

To address the objective, this investigation includes groundwater sample collection from the existing monitoring well network at the former NWIRP Bethpage and surface water sample collection from a manhole in the Recharge Basin Area. The existing monitoring well network provides upgradient and downgradient locations for the eastern portion of the facility and downgradient locations for the western portion of the facility, but lacks upgradient locations for the western portion of the facility. Therefore, if contamination is detected in the western portion of the facility, the investigation may not be able to conclude whether it originated on the former NWIRP Bethpage property. Also included in the investigation is the collection of water samples from the manhole near the northeast recharge basin. A continuous flow of water from Bethpage Community Park enters the manhole from the east. In addition, water from the Northrop Grumman North Campus has been observed to enter the manhole from the north. A sample will be collected from each source.

Proposed sample locations are presented on Figure 2. The well and sample location details, nomenclature, and analyses are summarized on Table 1.

Groundwater Sampling

Groundwater samples will be collected from all the usable monitoring wells within the existing on-property network (Figure 2). Monitoring wells will be investigated approximately two weeks before the sampling event, and if a well is determined to be damaged and cannot be readily repaired, it will not be sampled. In addition, for those monitoring wells that have not be sampled in the past 8 years (see Table 1), the well screen and casing will be purged approximately 2 weeks prior to the sampling event.

A down-hole, variable speed, submersible, centrifugal pump (e.g., Monsoon) with high-density polyethylene tubing will be used for groundwater purging and collection activities. The pump will be used in combination with a continuous flow-through cell suitable for taking water quality measurements (dissolved oxygen, oxidation-reduction potential, specific conductance, pH, temperature, and turbidity). Turbidity measurements will be made using a separate field turbidity meter specifically designated to measure turbidity only. Depending on stabilization of the groundwater parameters, two to five screen volumes may be purged prior to sample collection. The groundwater monitoring wells will be analyzed as indicated on Table 1.

Surface Water Sampling

Surface water will be collected from the manhole near the northeast recharge basin (Figure 2). Samples will be collected from the influent line prior to the water blending with other sources in the manhole. One sample will be collected from Bethpage Community Park influent water and one sample will be collected from the Northop Grumman North Campus influent water, if flow is observed. If active flow from another source is identified in the manhole, it will also be sampled. Samples will be collected with a stainless steel bailer and will be analyzed as indicated on Table 1. Water quality parameters (dissolved oxygen, oxidation-reduction potential, specific conductance, pH, temperature, and turbidity) will be collected directly from the bailer at the time of sample collection.

Quality Control Samples

Quality assurance and quality control samples will be collected for groundwater and surface water samples. Duplicate samples will be collected at 10 percent (1 per 10 samples). Matrix spike and matrix spike duplicate (MS/MSD) samples (i.e., triple volume) will be collected at a rate of 5 percent (1 per 20 samples). MS/MSDs will receive the same sample ID as the respective parent samples, and the triple volume will be noted in the field log book and on chain-of-custody form.

Equipment Decontamination

Reusable sampling equipment decontamination will consist of washing using a non-phosphate detergent followed by a rinse with deionized water provided by the laboratory.

Waste Management

Aqueous investigative-derived waste (IDW) will be generated during well sampling activities. The aqueous IDW will be containerized pending waste characterization analysis. IDW will be characterized for radiological materials, VOCs, semivolatile organic compounds, pesticides, Target Analyte List metals, and reactivity. Based on the results of the waste characterization, the

waste will be discharged via the local industrial wastewater discharge permit or transported offsite and appropriately disposed by the IDW subcontractor.

Reporting

The data collected will be evaluated and submitted in a Preliminary Assessment/Site Inspection Report. The evaluation will be based on direct comparison to New York State MCLs and United States Environmental Protection Agency MCLs. Pending review of analytical results and consultation with New York State Department of Environmental Conservation, a determination will be made whether additional sampling is to be conducted. Recommendations will be made on whether to proceed with additional action (e.g. another more refined round of sampling), remedial investigation, risk assessment, or a no action decision.

REFERENCES

Arcadis, 2016. *Review of Files Containing Radiological Information for Northrop Grumman Bethpage, NY Operations*. Administrative File Record Number N90845.AR.002016. September.

Sive Paget & Riesel, P.C., 2016. Letter to NYSDEC prepared by Sive Paget & Riesel on behalf of Northrop Grumman Re: Investigation of Radioactive Materials at Northrop Grumman's Bethpage Facility. September.

TABLES

This page is intentionally blank

TABLE 1
MONITORING WELL DETAILS AND SAMPLE NOMENCLATURE
FACILITY WIDE RADIUM AND RADIOLOGICAL MATERIAL INVESTIGATION
NWIRP BETHPAGE, NEW YORK

Sample ID Number/Nomenclature[1,2]	Matrix	Depth of Screened Interval (feet bgs)	Analysis[3]
BPHNMW08D-2018MMDD	Groundwater	188	Radiological
BPS1-TT-MW301D-2018MMDD	Groundwater	210-220	Radiological
BPS1-TT-MW301I-2018MMDD	Groundwater	130-140	Radiological
BPS1-TT-MW301S-2018MMDD	Groundwater	51-61	Radiological
BPS1-TT-MW302D-2018MMDD	Groundwater	203-213	Radiological
BPS1-TT-MW302I1-2018MMDD	Groundwater	110-120	Radiological
BPS1-TT-MW302I2-2018MMDD	Groundwater	140-150	Radiological
BPS1-TT-MW302S-2018MMDD	Groundwater	41-51	Radiological
BPS1-TT-MW303D-2018MMDD	Groundwater	208-218	Radiological
BPS1-TT-MW303I1-2018MMDD	Groundwater	95-105	Radiological
BPS1-TT-MW303I2-2018MMDD	Groundwater	146-156	Radiological
BPS1-TT-MW303S-2018MMDD	Groundwater	46-56	Radiological
BPS1-TT-MW304D-2018MMDD	Groundwater	180-190	Radiological
BPS1-TT-MW304I1-2018MMDD	Groundwater	102-112	Radiological
BPS1-TT-MW304I2-2018MMDD	Groundwater	140-150	Radiological
BPS1-TT-MW304S-2018MMDD	Groundwater	43-53	Radiological
BPS1-TT-MW305D-2018MMDD	Groundwater	286-296	Radiological
BPS1-TT-MW305I-2018MMDD	Groundwater	190-200	Radiological
BPS1-TT-MW305S-2018MMDD	Groundwater	40-50	Radiological
BPS1-TT-MW306D-2018MMDD	Groundwater	284-294	Radiological
BPS1-TT-MW306I-2018MMDD	Groundwater	189-199	Radiological
BPS1-TT-MW306S-2018MMDD	Groundwater	50-60	Radiological
BPS1-TT-MW307D-2018MMDD	Groundwater	276-286	Radiological
BPS1-TT-MW307I-2018MMDD	Groundwater	188-198	Radiological
BPS1-TT-MW307S-2018MMDD	Groundwater	40.5-50.5	Radiological
BPS1-TT-MW308D-2018MMDD	Groundwater	250-260	Radiological
BPS1-TT-MW308I-2018MMDD	Groundwater	156-166	Radiological
BPS1-TT-MW308-2018MMDD	Groundwater	54-64	Radiological
BPS1-TT-MW309D-2018MMDD	Groundwater	252-262	Radiological
BPS1-TT-MW309I-2018MMDD	Groundwater	160-170	Radiological
BPS1-TT-MW309S-2018MMDD	Groundwater	53-63	Radiological
BPS1-TT-MW310S-2018MMDD	Groundwater	57.5-67.5	Radiological
BPS1-TT-MW311I-2018MMDD	Groundwater	160-170	Radiological
BPS1-TT-MW311S-2018MMDD	Groundwater	55-65	Radiological
BPS1-TT-MW312I-2018MMDD	Groundwater	160-170	Radiological
BPS1-TT-MW312S-2018MMDD	Groundwater	53-63	Radiological
BPS1-TT-MW313S-2018MMDD	Groundwater	53-63	Radiological
BPS1-TT-MW314I-2018MMDD	Groundwater	144-154	Radiological
BPS1-TT-MW314S-2018MMDD	Groundwater	55-65	Radiological
BPS1FWM 03-2018MMDD	Groundwater	52-67	Radiological
FW-01-2018MMDD	Groundwater	48.5-63.5	Radiological
FW-02-2018MMDD	Groundwater	52-67	Radiological
HN-24IR-2018MMDD	Groundwater	148-158	Radiological
HN-24S-2018MMDD	Groundwater	48.6-58.6	Radiological
HN-29D-2018MMDD	Groundwater	210-220	Radiological
HN-29IR-2018MMDD	Groundwater	120-130	Radiological

TABLE 1
MONITORING WELL DETAILS AND SAMPLE NOMENCLATURE
FACILITY WIDE RADIUM AND RADIOLOGICAL MATERIAL INVESTIGATION
NWIRP BETHPAGE, NEW YORK

Sample ID Number/Nomenclature[1,2]	Matrix	Depth of Screened Interval (feet bgs)	Analysis[3]
BPTTAOC-22-MW01-2018MMDD	Groundwater	48-68	Radiological
BPTTAOC-22-MW02-2018MMDD	Groundwater	46-66	Radiological
BPTTAOC-22-MW03-2018MMDD	Groundwater	45.5-65.5	Radiological
BPTTAOC-22-MW04-2018MMDD	Groundwater	46-66	Radiological
BPTTAOC-22-MW05-2018MMDD	Groundwater	47-67	Radiological
BPTTAOC-22-MW06-2018MMDD	Groundwater	52-62	Radiological
BPTTAOC-22-MW07-2018MMDD	Groundwater	52-62	Radiological
BPTTAOC-22-MW08-2018MMDD	Groundwater	52-62	Radiological
BPTTAOC-22-MW09-2018MMDD	Groundwater	52-62	Radiological
BPTTAOC-22-MW10-2018MMDD	Groundwater	49-59	Radiological
BP-MH-SW4001-XXXX-2018MMDD	Surface Water	NA	Radiological
BP-MH-SW4001-XXXX-2018MMDD	Surface Water	NA	Radiological

Notes:

Shaded rows indicate wells that were installed prior to 2010. Wells that were installed prior to 2010, and that have not been sampled since 2010 will be subjected to an extended well screen and casing purge approximately two weeks prior to sampling.

1 MMDD is the two digit month and two digit day that the sample is collected. As an example, if BPTT-MW313S is sampled on April 10, 2018, the sample nomenclature would be BPTT-MW313S-20180410.

XXXX is the direction from which the influent is flowing into the manhole. As an example, if the sample is collected on April 10, 2018 from a source entering the manhole from the north, the sample nomenclature would BP-MH-SW4001-NORTH-20180410.

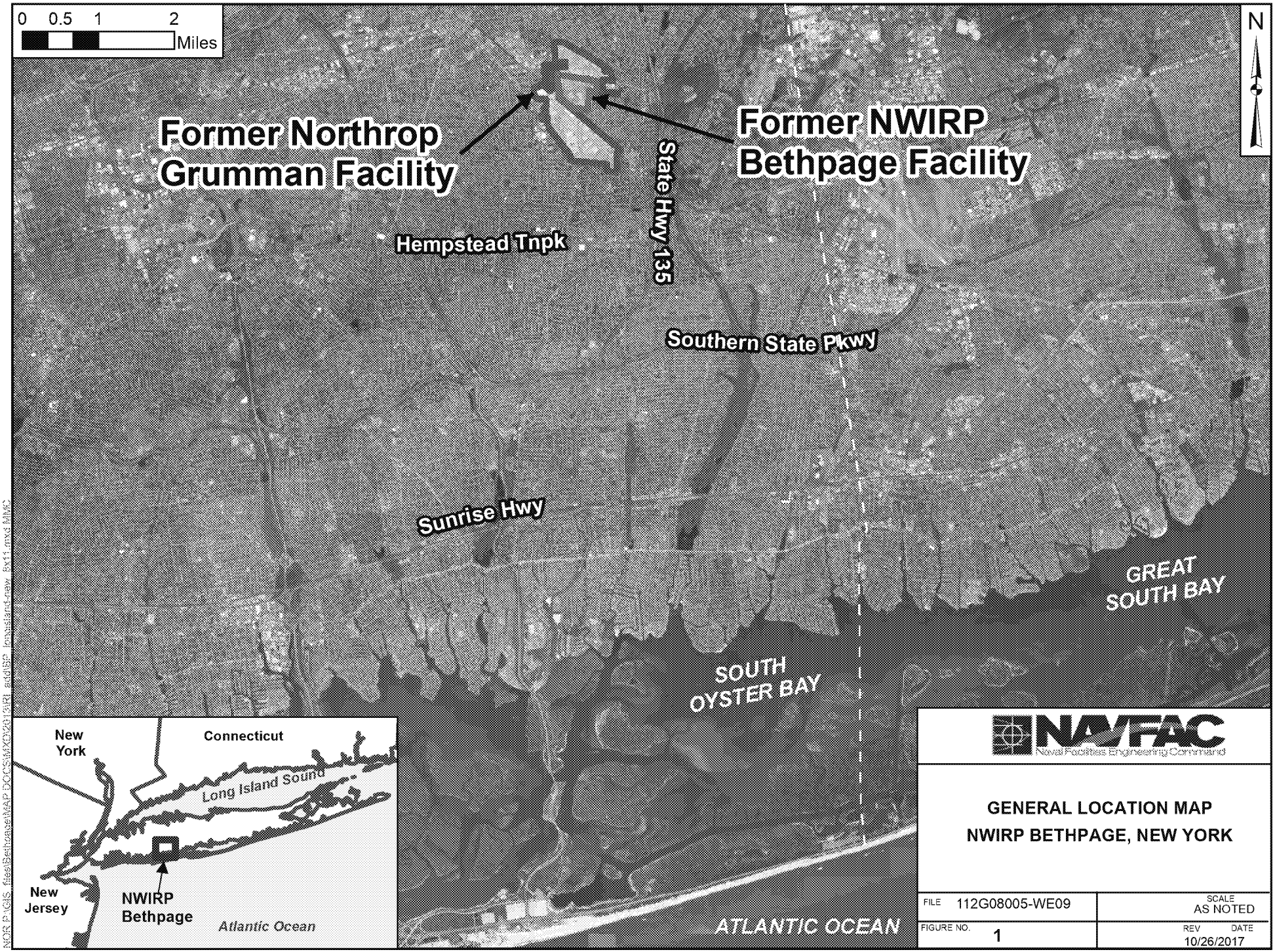
2 Locations where field duplicates will be collected will be determined in the field by the Tetra Tech FOL.

3 Water quality parameters consisting of dissolved oxygen, oxidation- reduction potential, specific conductance, pH, temperature, and turbidity will be collected at each location.

Radiological Analyses:
Radium-226 + Radium-228 by EPA Method 903.1 and 904.0
Isotopic Thorium (-228, -230, -232) by DOE Method HASL 300-Th-01
Isotopic Uranium (-233/234, -235/236, -238) by DOE Mehod HASL 300-U-02
Gross Alpha Activity (excluding uranium and radon) by EPA Method 900
Gross Beta Activity by EPA Method 900

FIGURES

This page is intentionally blank



NAVFAC
Naval Facilities Engineering Command

GENERAL LOCATION MAP
NWIRP BETHPAGE, NEW YORK

FILE	112G08005-WE09	SCALE	AS NOTED
FIGURE NO.	1	REV DATE	10/26/2017

ED_002631A_00011458-00011

ED_002631A_00011458-00012